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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

BLACKWELL RUDASIL, GWENDOLYN A

ART UNIT PAPER NUMBER

1775

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--|--------------------------------------|--|
| Office Action Summary | Application No. 10/720,427 | Applicant(s) RUBBIA ET AL. | |
| | Examiner Gwendolyn A. Blackwell-Rudasill | Art Unit 1775 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☒ Claim(s) 6-8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>2/13/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

1. Claims 1-8 are examined on the merits.

Specification

2. The disclosure is objected to because of the following informalities:

Page 4 defines the photo-thermal conversion efficiency as η_{pt} . Page 8, Table 2 contains the term η_p , which is not defined in the specification. Is this supposed to be the photo-thermal conversion efficiency. Clarification is required.

Claim Objections

3. Claim 3 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 3, lines 2-4 includes the limitation that "the lower CERMET layer is formed of a ceramic matrix comprising amorphous silicon dioxide in which molybdenum is dispersed at a volumetric fraction lower than that of an adjacent CERMET layer". Claims 1 and 2 require that the lower CERMET layer have a higher volumetric fraction than the upper CERMET layer. The specification also indicates that the lower CERMET layer has a greater volumetric fraction than the upper CERMET layer. Clarification is required as to the proper distribution of the volumetric fraction in claim 3.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent no. 5,523,132, Zhang et al in view of United States Patent no. 5,927,271, Winston et al further in view of United States Patent no. 4,582,764, Allerd et al.

Regarding claim 1

Zhang et al disclose a thin film solar selective surface coating, that can be used in a solar collector, comprised of an infrared reflective metal (lower layer), at least two cermet (intermediate layers) layers formed thereon, (column 2, lines 24-44), and an antireflective film (upper layer) formed on the cermet layers, (column 3, lines 24-27). The cermet layers, comprised of metal and a dielectric matrix, have different volumetric metal fractions across the

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individual layers, wherein the metal can be molybdenum and the matrix material can be silicon dioxide, (column 6, lines 8-18, claim 13). Silicon dioxide can be used for the antireflective layer, (column 5, lines 9-15). Zhang et al do not disclose that the upper cermet layer should have a lower volumetric fraction than the lower cermet layer and that the silicon dioxide layer is amorphous as claimed by Applicant.

Winston et al disclose a solar collector having a coating thereon. The coating is comprised a solar absorber layer (intermediate layer) that is made of a dielectric material with a particular fraction of metal composition disposed on a metal reflector layer having an antireflection coating. The top layer of the cermet has a higher metal fraction than the lower cermet layer.

Allerd et al disclose a coating used in photothermal applications comprised of an infrared reflective layer, an absorbing layer, and an antireflective layer. Molybdenum can be used as the reflective layer, (column 5, lines 23-26). The solar absorbing layer is comprised of amorphous materials such as silicon, (column 5, lines 45-53). The antireflection layer is comprised of an amorphous material of silicon and oxygen, (columns 5-6, lines 67-12).

Zhang et al disclose a coating used on a solar collector wherein the coating is comprised of an infrared reflective metal, cermet layers, and an antireflective layer. Winston et al disclose a solar collector having a coating formed thereon comprised of an infrared reflective metal layer, a solar absorbing layer, and an antireflective layer. Allerd et al disclose a coating used in photothermal applications comprised of an infrared reflective layer, an absorbing layer, and an antireflective layer.

As Zhang et al, Winston et al, and Allerd et al are analogous inventions, it would have been within the skill of one in the art at the time of invention to modify the volumetric fractions of the cermet layers of Zhang et al with the metal fractions of Winston et al in order to have cermet layers with the lower layer having a higher metal fraction than the upper layer, which allows the lower layer to absorb more energy thereby allowing only the low doped top layer to radiate heat away, (Winston et al, column 4, lines 38-59).

It also would be within the skill of one in the art at the time of invention to further modify the Zhang/Winston solar collector by using amorphous silicon dioxide as the particular form of silicon dioxide as it is easier and less expensive to deposit and can be deposited at temperatures lower than those required for depositing crystalline materials, (column 3, lines 4-11).

Regarding claims 2-5

Zhang et al disclose that the reflective metal layer has a thickness in the range of 100-300 nm, (column 4, lines 1-12). The cermet layers have a thickness ranging from 20-80 nm, (column 4, lines 28-32). The low to high metal volume fraction is on the order of 4:5, (columns 5, lines 2-8). The antireflective film has a thickness ranging from 40-70 nm, (column 5, lines 12-16). The coating can be used in temperatures ranging from 300-500°C, (column 4, lines 39-49). Zhang et al do not specifically disclose the exact thickness as set forth in claim 5.

Absent a showing of criticality with respect to thickness (a result effective variable), it would have been obvious to a person of ordinary skill in the art at the time of the invention to adjust the thickness of the layers through routine experimentation in order to achieve an absorptive coating over the widest possible spectral range, (Zhang et al, column 3, lines 16-28).

It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

7. Claims 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record do not teach or disclose the combination of physical properties, such as the specific absorptivity, emissivity, and conversion efficiency as claimed by Applicant.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gwendolyn A. Blackwell-Rudasill whose telephone number is (571) 272-1533. The examiner can normally be reached on Monday - Thursday; 5:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gwendolyn A. Blackwell-Rudasill
Examiner
Art Unit 1775


gbr


DEBORAH JONES
SUPERVISORY PATENT EXAMINER